



[4910-13-P]

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

**[Docket No. FAA-2006-25738; Directorate Identifier 2006-NE-27-AD; Amendment 39-16961; AD 2012-04-05]**

**RIN 2120-AA64**

**Airworthiness Directives;** General Electric Company (GE) Turbofan Engines

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

**SUMMARY:** We are superseding an existing airworthiness directive (AD) for all GE CF6-80C2B series turbofan engines. That AD currently requires installing software version 8.2.Q1 to the engine electronic control unit (ECU), which increases the engine's margin to flameout. This new AD requires the removal of the affected ECUs from service. This AD was prompted by two reports of engine flameout events during flight in inclement weather conditions, eight reports of engine in-flight shutdown (IFSD) events caused by dual-channel central processing unit (CPU) faults in the ECU, and four reports of engine flameout ground events. We are issuing this AD to prevent engine flameout or un-commanded engine IFSD of one or more engines, leading to an emergency or forced landing of the airplane.

**DATES:** This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:**

**Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov>; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday

through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (phone: 800-647-5527) is Document Management Facility, U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.

**FOR FURTHER INFORMATION CONTACT:** Tomasz Rakowski, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: 781-238-7735; fax: 781-238-7199; e-mail: tomasz.rakowski@faa.gov.

**SUPPLEMENTARY INFORMATION:**

**Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 to supersede AD 2007-12-07, Amendment 39-15085 (72 FR 31174, June 6, 2007). That AD applies to the specified products. The NPRM was published in the Federal Register on November 14, 2011 (76 FR 70382). That NPRM proposed to remove the affected ECUs from service.

**Comments**

We gave the public the opportunity to participate in developing this AD. The following presents the comments received on the proposal and the FAA's response to each comment.

**Request to Change Unsafe Condition**

Commenter GE stated that in all of the events of flameout the engines relit and in all dual-channel CPU fault in-flight shutdowns the engines were capable of restarting. GE stated that these events should not be considered unsafe conditions.

We do not agree. Although a flameout with a consecutive relight or an in-flight shutdown with a consecutive restart during cruise flight is not in itself an unsafe

condition, these types of loss of thrust can be unsafe conditions during takeoff or during approach and landing. We did not change the AD.

#### **Request to Clarify Engine Flight Cycle and ECU Cycle Count**

Commenter All Nippon Airways (ANA) requested that we clarify the relationship between the engine flight cycles and ECU cycles of operation in the engine, and whether previous ECU history affects the flight cycle count.

We do not agree. The flight cycle intervals in paragraph (g) of the AD refer to the engine start-stop cycles with the affected ECU part numbers (P/Ns) installed, rather than ECU operational cycles. Engine flight cycles accrued before the effective date of the AD are not accounted for in the cycle count. We did not change the AD.

#### **Request to Remove Certain Affected ECU P/Ns from the AD**

Commenters Atlas Air, ANA, KLM, and China Airlines requested that we remove from the list of affected ECU P/Ns in Table 2 of the AD, ECUs with software version 8.2.Q1 and 8.2.R, a new front panel assembly (FPA) and an old pressure subsystem (PSS), or an old FPA and a new PSS generation circuit boards.

We do not agree. Dual-channel CPU faults have not been ruled out for the new FPA or the new PSS, therefore any ECU with either a new FPA or a new PSS must be addressed regardless of the version of software installed. We did not change the AD.

#### **Request to Add ECU P/Ns to the AD**

Commenter Atlas Air stated that ECUs P/Ns 1471M63P41, 1519M89P31, and 1820M33P14 are not listed in the proposed AD, but should be listed.

We do not agree. Those ECUs have the old generation of FPA and PSS circuit boards and, therefore, are not susceptible to dual-channel CPU faults. The referenced ECUs also have the latest available version of software installed. We did not change the AD.

**Request to Mandate Software Version 8.2.R or Later**

Commenter Atlas Air requested to add a requirement to install software version 8.2.R or later in all affected engines at specified times, without regard to FPA and PSS circuit board hardware configuration.

We do not agree. Certain ECU P/Ns that have software version 8.2.R are susceptible to CPU channel faults. We did not change the AD.

**Request to Modify ECUs**

Commenter Atlas Air requested to modify ECU P/Ns 1471M63P42, 1519M89P32, and 1820M33P15 to ECU P/Ns 1471M63P41, 1519M89P31, and 1820M33P14, respectively.

We do not agree. No approved procedure exists to downgrade the ECUs. Engine owners and operators may propose such a procedure for approval, and request an alternative method of compliance to the AD, as specified in paragraph (i) of the AD. We did not change the AD.

**Request to Add ECU Rework Procedures**

Commenter ANA requested that we add rework procedures to the AD to modify affected ECUs into serviceable configurations of ECUs.

We do not agree. The AD is written to only remove affected ECU P/Ns from service. Refer to the manufacturer's service information for upgrading affected ECUs. We did not change the AD.

**Conclusion**

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting the AD as proposed.

**Costs of Compliance**

We estimate that this AD will affect 697 GE CF6-80C2B series turbofan engines installed on airplanes of U.S. registry. We also estimate that it will take about 4 work-

hours per engine to perform a removal and replacement of the ECU, and that the average labor rate is \$85 per work-hour. A replacement ECU costs about \$4,600. Based on these figures, we estimate the total cost of the AD to U.S. operators to be \$3,443,180.

### **Authority for this Rulemaking**

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, Section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the Agency's authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

### **Regulatory Findings**

We have determined that this AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979),
- (3) Will not affect intrastate aviation in Alaska, and

(4) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

#### **List of Subjects in 14 CFR Part 39**

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

#### **Adoption of the Amendment**

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

#### **PART 39 - AIRWORTHINESS DIRECTIVES**

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

#### **§ 39.13 [Amended]**

2. The FAA amends § 39.13 by removing airworthiness directive (AD) 2007-12-07, Amendment 39-15085 (72 FR 31174, June 6, 2007), and adding the following new AD:

2012-04-05 **General Electric Company (GE)**: Amendment 39-16961; Docket No. FAA-2006-25738; Directorate Identifier 2006-NE-27-AD.

#### **(a) Effective Date**

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

#### **(b) Affected ADs**

This AD supersedes AD 2007-12-07, Amendment 39-15085 (72 FR 31174, June 6, 2007).

#### **(c) Applicability**

This AD applies to GE CF6-80C2B1F, CF6-80C2B1F1, CF6-80C2B1F2, CF6-80C2B2F, CF6-80C2B3F, CF6-80C2B4F, CF6-80C2B5F, CF6-80C2B6F, CF6-

80C2B6FA, CF6-80C2B7F, and CF6-80C2B8F turbofan engines, including engines marked on the engine data plate as CF6-80C2B7F1.

**(d) Unsafe Condition**

This AD results from:

(1) Two reports of engine flameout events during flight in inclement weather conditions; and

(2) Eight reports of engine in-flight shutdown (IFSD) events caused by dual-channel central processing unit (CPU) faults in the electronic control unit (ECU); and

(3) Four reports of engine flameout ground events.

(e) We are issuing this AD to prevent engine flameout or un-commanded engine IFSD of one or more engines, leading to an emergency or forced landing of the airplane.

**(f) Compliance**

Comply with this AD within the compliance times specified, unless already done.

**(g) ECU Removal**

(1) Remove from service ECUs with part numbers (P/Ns) listed in Table 1 of this AD within 6 months or 450 engine flight cycles after the effective date of this AD, whichever occurs first.

**Table 1 - Affected ECU P/Ns**

1471M63P01	1471M63P02	1471M63P03	1471M63P04	1471M63P05
1471M63P06	1471M63P07	1471M63P08	1471M63P09	1471M63P10
1471M63P11	1471M63P12	1471M63P13	1471M63P14	1471M63P15
1471M63P16	1471M63P17	1471M63P18	1471M63P23	1471M63P24
1471M63P25	1471M63P26	1471M63P27	1471M63P28	1471M63P29
1471M63P30	1471M63P31	1471M63P32	1471M63P33	1471M63P34
1471M63P35	1471M63P36	1519M89P01	1519M89P02	1519M89P03
1519M89P04	1519M89P05	1519M89P06	1519M89P07	1519M89P08
1519M89P09	1519M89P10	1519M89P13	1519M89P14	1519M89P15

1519M89P16	1519M89P17	1519M89P18	1519M89P19	1519M89P20
1519M89P21	1519M89P22	1519M89P23	1519M89P24	1519M89P25
1519M89P26	1820M33P01	1820M33P02	1820M33P03	1820M33P04
1820M33P05	1820M33P06	1820M33P07	1820M33P08	1820M33P09

(2) Remove from service ECUs with P/Ns 2121M37P01, 2121M37P02, 2121M38P01, 2121M38P02, 2121M41P01 and 2121M41P02 within 14 months or 1,050 engine flight cycles after the effective date of this AD, whichever occurs first.

(3) Remove from service ECUs with P/Ns listed in Table 2 of this AD within 60 months or 4,500 engine flight cycles after the effective date of this AD, whichever occurs first.

**Table 2 - Affected ECU P/Ns**

1471M63P37	1471M63P38	1471M63P39	1471M63P40	1471M63P42
1519M89P27	1519M89P28	1519M89P29	1519M89P30	1519M89P32
1820M33P10	1820M33P11	1820M33P12	1820M33P13	1820M33P15
2121M25P01	2121M25P02	2121M26P01	2121M26P02	2121M29P01
2121M29P02	2121M37P03	2121M38P03	2121M41P03	

#### **(h) Installation Prohibition**

(1) After the effective date of this AD, do not install any ECU P/N listed in Table 1 of this AD onto any airplane.

(2) After the effective date of this AD, do not operate any airplane with more than one ECU P/N 2121M37P02, 2121M38P02, or 2121M41P02 installed.

#### **(i) Alternative Methods of Compliance (AMOCs)**

The Manager, Engine Certification Office, FAA, may approve AMOCs for this AD. Use the procedures in 14 CFR 39.19 to make your request.



**(j) Related Information**

For more information about this AD, contact Tomasz Rakowski, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; phone: 781-238-7735; fax: 781-238-7199; e-mail: [tomasz.rakowski@faa.gov](mailto:tomasz.rakowski@faa.gov).

**(k) Material Incorporated by Reference**

None.

Issued in Burlington, Massachusetts, on February 17, 2012.

Peter A. White,  
Manager, Engine & Propeller Directorate,  
Aircraft Certification Service.

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